ಕರ್ನಾಟಕ ರಸ್ತೆ ಅಭಿವೃದ್ಧಿ ನಿಗಮ ನಿಯಮಿತ
Karnataka Road Development Corporation Ltd.

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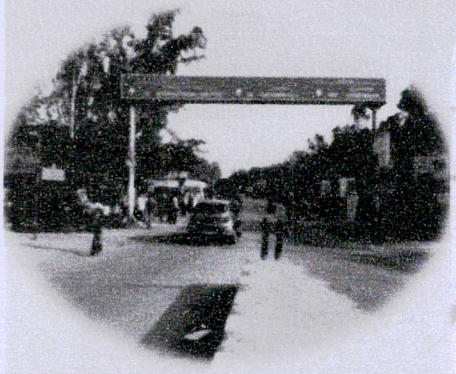
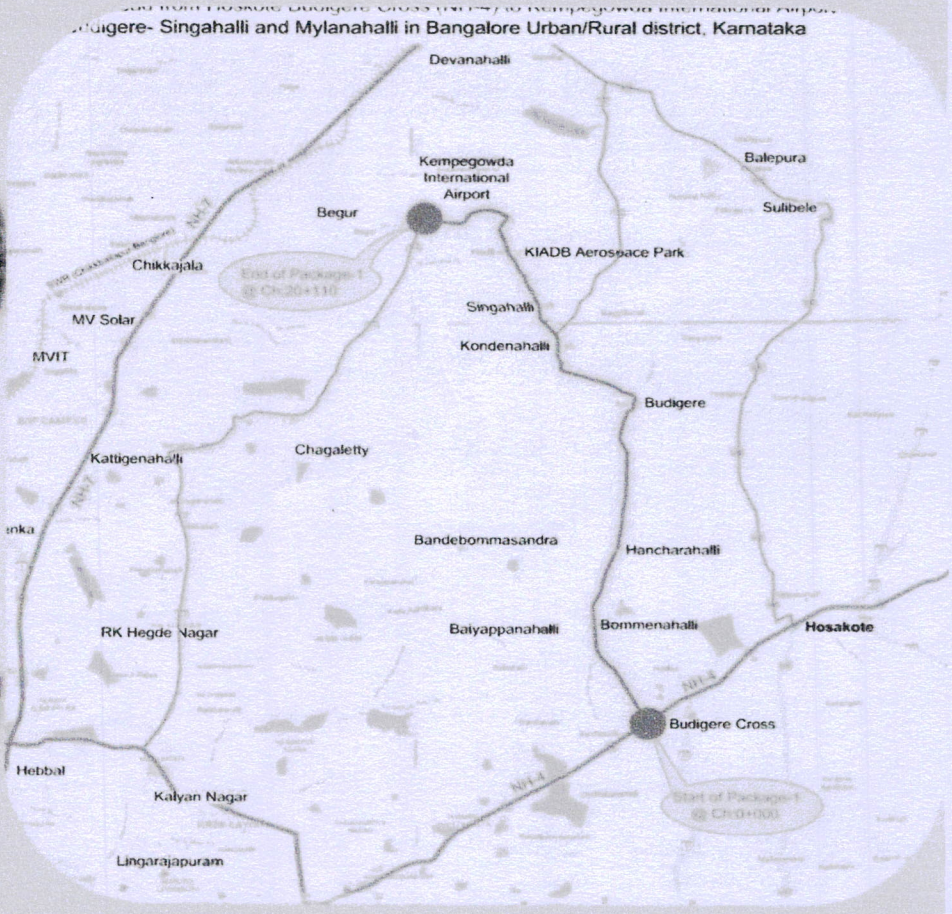
"Consulting Services for Preparation of Detailed Feasibility Report (DFR) for Development of Road from Hoskote Budigere Cross (NH-4) to Kempegowda International Airport road via Budigere- Singahalli and Mylanahalli in Bangalore Urban/Rural district, Karnataka"

EXECUTIVE SUMMARY





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EXECUTIVE SUMMARY

E.1 INTRODUCTION

KRDCL is a company under the Public Works, Ports & Inland Water Transport Department. This Company was established to promote surface infrastructure by taking up Road Works, Bridges etc., and to improve road network by taking up construction, widening and strengthening of roads, construction of bridges, maintenance of roads etc., and to take up projects on BOT, BOOT, BOLT. With the emerging industrial and economic development of the past few decades, there has been a tremendous growth in terms of the traffic on all the roads. The traffic on rural roads has increased substantially in the recent past, and is likely to continue in the future also. Thus, road users are facing enormous congestion due to increase in traffic leading to reduced journey speeds, increased travel time/ travel-cost, thereby creating inconvenience and discomfort to users and ultimately leading to national losses. On recognizing this, Government of Karnataka has initiated several road development projects.

In this regard, KRDCL as envisioned one such project to link alternate road connecting proposed Terminal 2 of Bangalore International Airport.

The Proposed project alignment starts at Hoskote Budigere Cross of NH-4 section and ends at Mylanahalli village near Kempegowda International Airport, with a total length of 20.110 Kms, which runs through Mandur, Budigere, Singahalli, Mylanahalli. This road will serve as a major alternate link road to Kempegowda International Airport for localities in and around eastern part of Bangalore. Thus, contributing substantially towards the development of local economy. Further a number of remote villages are also being provided connectivity

KRDCL is desirous to obtain Detailed Feasibility Report (DFR) from the Consulting Services, in Bangalore Urban/Rural district, Karnataka with a view to widen and develop the existing two-lane highway. ***Karnataka Road Development Corporation Limited (KRDCL)*** has assigned the task of preparation of the DFR to ***M/s Infra Support Engineering Consultants Pvt Ltd (ISECPL)***. The project is coined as **"Consulting Services for Preparation of Detailed Feasibility Report (DFR) for Development of Road from Hoskote Budigere Cross (NH-4) to Kempegowda International Airport road via Budigere, Singahalli and Mylanahalli in Bangalore Urban/Rural district, Karnataka. Length 22.000 Km (Approximate**

E.2 SALIENT FEATURES OF PROJECT ROAD

- The project passes through Budigere – Singahalli – Mylanahalli village in Bangalore urban/rural district, Karnataka. serve as a major alternate link road to Kempegowda International Airport for localities in and around eastern part of Bangalore. Total length of the project road is 20.110 km.
- The Project road is amalgamation of erstwhile State Highway's, MDR and National Highway
- The project stretch is located in the state of Karnataka which is located between 798298.80 m E 1443880.22 m N and 792245.41 m E 1459066.94 m N.
- The project road is predominantly two-lane carriageway except at KIADB IT Park it varies from four lanes to six lane carriageways.
- In general, the terrain is Plain & Rolling. The area is covered with silty soil, Gravel, and clay type soil.
- Land use is mainly agricultural with passing through the built-up areas of towns and villages enroute. Important towns along the alignment are Mandur, Budigere, Singahalli and Mylanahalli at Bangalore urban/rural district.
- Nearly 71% of land use is of mixed type which includes built- up areas on left side and right side of carriageway, 5 % of Forest Area, and 24% of the project road has agricultural land/ open/barren land.
- The width of carriageway is varying from 7.0 m to 9.5m. Shoulders are primarily earthen in composition and width varies from 0.5 to 2.0 m.
- The condition of the existing pavement is categorized as Fair to poor.
- The existing alignment of the road has many substandard curves. The alignment is being improved to meet the minimum design speed applicable to respective terrain classes. The existing horizontal alignment is being followed to the extent possible to avoid undue land and property acquisitions.
- CBR of existing soil varies from 7% to 14%
- BBD (characteristic deflection) value of existing pavement varies from 0.47 to 1.0
- There are 3 No's of major junctions and 66 No's of Minor Junctions along the project Road.

- There are 2 No's of minor bridges.
- There are 37 numbers of Existing Culverts along the project road consisting of 1 No's Hume Pipe type 36 No's slab culverts.

E.3 TRAFFIC

In order to understand the characteristics and the volume of traffic using the project road, traffic volume details and origin-destination of trips of vehicles plying on the project road were collected through primary surveys. For this purpose, a detailed reconnaissance survey was conducted to identify the appropriate locations for carrying out the mid-block count and origin-destination surveys.

Table E-1 : Traffic Survey Schedule

Sl. No	Station No.	Location Name	Date and Duration
Classified Traffic Volume Count			
2	TVC 01	Mandur village @ chainage 4+000	16.8.2017 to 22.08.2017 (7 Days)
Origin – Destination Survey			
5	TVC 01	Mandur village @ chainage 4+000	21.08.2017 to 22.08.2017 (1 Day)
Turning Movement Count			
9	TMC 01	Budigere Cross(NH 4 road) Chainage @ 0+000	21.08.2017 (1 Day)
10	TMC 02	KIADB IT Park (Devanahalli Road (SH-104), Baglur Road, KIA Road) @ Chainage @ 14+000	21.08.2017 (1 Day)
11	TMC 03	Mylanahalli Village (KIA Road, BK Palya Road, Singahalli Road) @ Chainage @ 20+110	21.08.2017 (1 Day)

E.3.1 TRAFFIC VOLUME

Table E-2 : Traffic Volumes as observed at different Locations

Link	Location	AADT in Vehicles	AADT in PCU
Budigere Cross(NH-4) TO Kempegowda International Airport (*Both Direction*)		**13996**	**17520**

The traffic volume details for road stretch are studied and found that the capacity is exceeding the required capacity and need capacity augmentation within the available ROW. However, this road warrnts for development of Four lane road.

The project road starts from Budigere Cross, Hoskote (NH-4) and ends at Mylanahalli village over a length of 20.110 Kms. The existing road is a part of SH-104 passes via Singahalli and Kondenahalli

The traffic on Section - 01: Budigere Cross (NH-4 to Kempegowda International Airport (Ch: 0+000 to 20+110 Km) mainly consists of Passenger vehicles as this road will serve as a major alternate link road to Kempegowda International Airport for localities in and around eastern part of Bangalore.

The traffic coming from east and south-east part of Bangalore are travelling along the road to reach Kempegowda International Airport. The vehicles deviate from the proposed road at Kondenahalli and reach Airport via Devanahalli along SH 104 and NH 648. The commercial vehiclesdestined to airport cargo also travel along the proposed road.

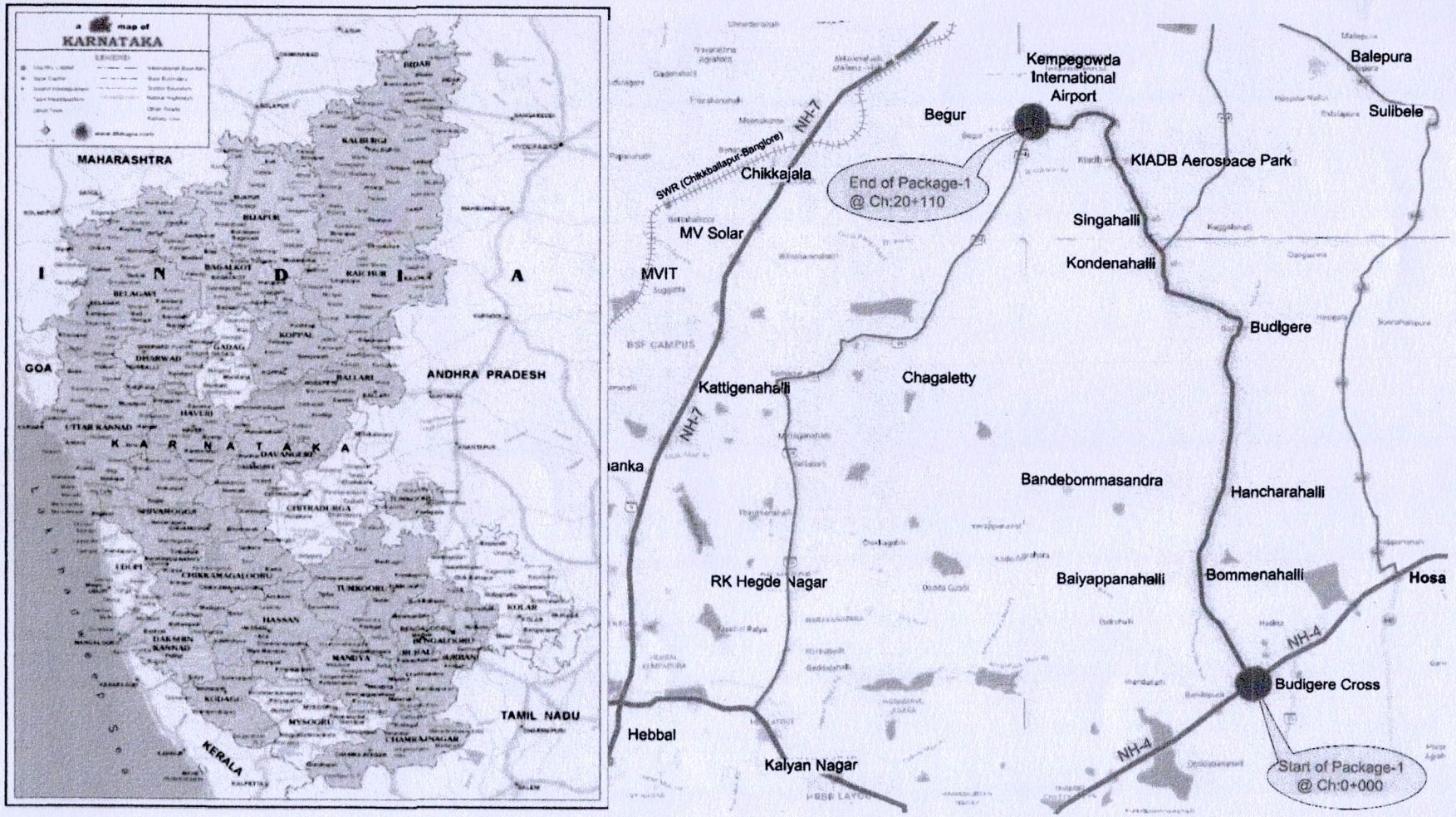

Figure E.1 : Key map showing existing project road

In conclusion, the section between Budigere cross to Kondenahalli carries reasonable traffic and is a potential section for development. However, the section between Kondenahalli to Kempegowda International Airport along the proposed road will also carry reasonable traffic and becomes a potential section for development once the airport proposed 2nd terminal project is completed.

E.4 ALIGNMENT

The proposed project alignment runs through three major Built ups with a total length of 14.71 Kms, out of which approximately 0.8 Kms length runs in Mandur, 0.5 Kms runs in Signahalli village, 0.3 Kms runs in Kadarayapanahalli village and 0.5 Kms runs in Mylanahalli of Bangalore urban/rural district, Karnataka.

Geometric Design aspect like speed of the alignment mainly depend on the type of terrain. The minimum design speed of 65 Kmph is adopted, to avoid the settlements being acquired, the design speed at some places is restricted to 50 Kmph. Terrain is classified by the general slope of the ground across the highway alignment. The terrain condition is given in below table.

Table E-3 : Terrain Classification

Packages	Length of Stretch (Km)	Terrain	Remarks From – To (Design Chainages)
Package-1	20.110	Plain & rolling	Budigere Cross, Hoskote (NH-4) (0+000) and ends at Mylanahalli village near Bangalore International Airport(20+110)
Total Length	**20.110**		

The existing alignment of the road has few substandard curves. The alignment is being improved to meet the minimum design speed applicable to respective terrain classes. The existing horizontal alignment is being followed to the extent possible to avoid undue land and property acquisitions.

E.5 IMPROVEMENT PROPOSALS

The upgradation proposals have been finalised keeping in view the existing geometry, and requirement of the design standards. The improvement proposals are basically proposed with 4/6 lanes road in rural areas and 4 lanes in urban locations. The summary of improvement proposals of Cross Sections are given in the table below.

The total length of package-1 is 20.110 Kms, in which 3.55 Kms length consists of 4-lane rural section 14.710 Kms length with 4-lane Builtup section, 1.35 Kms length consists of new construction of 4-lane in rural section and 0.5 Km length consists of new construction of 6-lane in rural section.

Table E-4 : Summary of Improvement Proposals of Cross Sections

Proposed Cross Section Type	Proposed RoW	Length in Kms
4-Lane Rural Section without Service Roads and with New Jersey Median (Utilization of Existing Carriageway)	23	3.200
4-Lane Built-up Section without Service Roads and with New Jersey Median (Utilization of Existing Carriageway)	18	14.710
4-Lane Rural Section without Service Roads, with Paved Shoulder and New Jersey Median (New Construction)	30	1.350
4-LaneRural section without Service Roads, with Paved Shoulder and Existing Raised Median (Utilization of Existing 4 - Lane Road)	23	0.350
6-Lane Rural Section without Service Roads, with Paved Shoulder and Existing Raised Median (Utilization of Existing 6 - Lane Road)	30	0.500

E.5.1 PROPOSED BYPASSES ON PROJECT ROAD

A detailed study has been completed to provide bypass option wherever is required along the project road. The bypasses are proposed at major settlement areas in order to improve the safety by avoiding heavy commercial traffic in towns, to decongestions at towns and ease movements of traffic. The bypasses are designed to ensure that they function properly as 4 lane bypass road.

Table E-5 : List of Proposed Bypasses & Realignments

Sl. No.	Name of Town	Start Chainage, in Km	End Chainage, in Km	Proposed bypass Length in Km	Bypass / Realignment
1	Budigere	9+950	11+300	1.350	Bypass

E.5.2 GRADE SEPERATED STRUCTURES, ROB'S AND RUB'S PROPOSALS

The proposed project road do not crosses any railway track, no grade separators are proposed.

Table E-6 : List of GRADE SEPARATOR/ROB/RUB

Sl.No.	Description	Design Chainage	Type of Structure	Span Configuration	Remarks
Nil					

E.5.3 VEHICULAR UNDERPASSES

No Vehicular Underpasses are proposed in the project road

Table E-7 : VUP/LVUP for Project Road

Sl. No	Design Chainage	VUP/LVUP	Dimensions	Remarks
Nil				

E.6 INVENTORY / REHABILITATION /BRIDGES / STRUCTURES

There are 41 numbers of Culverts and 2 no's of minor bridges along this project road.

The proposed structures are summarized and are given in the table below,

Table E-8 : Summary of Proposed Structures in Package-1

Type of Structures	Concentric Widening	Reconstruction	New construction	Retained	In Bypasses	Total No. of Structures
Major Bridges	-	-	-	-	-	-
Minor Bridges (Box Bridge)	1	1	-	-	-	2
Slab Culverts	-	-	-	-	-	-
Pipe Culverts	-	-	2	-	3	5
Box Culverts	16	15	1	4	-	36
Total No. of Proposed Structures						**43**

Table E-9 : Reconstruction of Major Bridges

Sl. No.	Existing Chainage in Kms	Proposed Chainage, in Kms	Proposed Structure				
			No of spans	Width of span (m)	Height (m)	Length (m)	Type
Nil							

Table E-10 : Proposals for Minor Bridges

Sl. No.	Ext. Chainage in Kms.	Proposed Chainage, in Kms	Proposed Structure				Widening/ Reconstruction	Type
			No of spans	Width of span (m)	Height (m)	Length (m)		
1	6+000	6+000	2	4	2	22.7	Reconstruction	Box Bridge
2	13+110	12+630	2	5.5	3.5	22.7	Concentric Widening	Box Bridge

E.7 HIGH EMBANKMENTS

There are no high embankments as such along the proposed project road

Table E-11 : High Embankment Details.

SI. No.	Design Chainage in Mts		Embankment Height in Mts	
	From	To	LHS	RHS
Nil				

E.8 MAJOR JUNCTIONS

The major road junctions are listed below and all these junctions are being improved as per relevant standards.

There are 3 major intersections in this project road. The configurations for major intersections are presented in tables below.

Table E-12 : Major Intersections /Junctions

Sl.No.	Design Chainage @ Km	Location	Intersection Type	Proposals
1	0+000	Budigere Cross(Bangalore-Hoskote road) KIA Road	T	At Grade Junction

Sl.No.	Design Chainage @ Km	Location	Intersection Type	Proposals
2	13+430	KIADB IT Park (Devanahalli Road (SH-104), Baglur Road, KIAL Road)	Y	At Grade Junction
3	20+020	Mylanahalli Village (KIAL Road, BK Palya Road, Singahalli Road)	T	At Grade Junction

E.9 MINOR JUNCTIONS

The minor road junctions are listed below and all these junctions are being improved as per relevant standards.

There are 66 minor intersections in this project road. The configurations for Minor intersections are presented in tables below.

Table E-13 : Minor Intersections /Junctions

Sl.No.	Design Chainage (Km)	Side	Type of Intersection	Other features
1	0+000	Both	T	Budigere Cross
2	1+880	RHS	T	Prestige Tranqility
3	2+080	Both	T	Prestige Tranqility
4	2+200	RHS	Y	Bendaginhalli Village
5	2+320	LHS	T	Bayappanahalli Village
6	3+960	Both	+	Mandur Village Limit
7	4+010	LHS	T	Mandur Village Limit
8	4+040	LHS	T	Mandur Village Limit
9	4+070	LHS	T	Mandur Village Limit
10	4+100	LHS	Y	Mandur Village Limit
11	4+130	Both	T	Mandur Village Limit
12	4+170	LHS	Y	Mandur Village Limit
13	4+220	Both	T	Mandur Village Limit
14	4+270	LHS	+	Mandur Village Limit
15	4+340	LHS	T	Mandur Village Limit
16	4+420	LHS	T	Mandur Village Limit
17	4+460	LHS	T	Mandur Village Limit
18	4+550	LHS	T	Mandur Village Limit
19	5+550	RHS	T	Raghuvanahalli

Sl.No.	Design Chainage (Km)	Side	Type of Intersection	Other features
20	5+870	Both	+	Kattu Gollahalli Gate Cross
21	6+780	RHS	T	Jyothipura Cross
22	7+660	Both	+	Thirumanahalli
23	8+210	RHS	T	Andrahalli Cross
24	9+110	LHS	T	Hittarahalli Gate Bus Stop
25	9+140	RHS	T	Hittarahalli Village Limit
26	12+440	LHS	Y	Manchapanhalli
27	13+250	LHS	T	Gollahalli
28	13+420	RHS	T	Devanahalli Road
29	13+710	Both	+	Arebannimangla Road
30	13+930	RHS	T	Ramanahalli Road
31	14+520	LHS	T	Near Singahalli village
32	14+600	RHS	T	Near Singahalli village
33	14+630	LHS	T	Near Singahalli village
34	14+650	RHS	T	Near Singahalli village
35	14+720	LHS	T	Near Singahalli village
36	14+760	LHS	T	Near Singahalli village
37	14+850	LHS	T	Near Singahalli village
38	16+080	LHS	T	Kavadedasarahalli
39	16+250	Both	+	Kavadedasarahalli
40	16+960	RHS	T	Kadayrapanahalli Village Limit
41	16+970	LHS	T	Kadayrapanahalli Village Limit
42	17+000	Both	+	Kadayrapanahalli Village Limit
43	17+030	LHS	T	Kadayrapanahalli Village Limit
44	17+050	LHS	T	Kadayrapanahalli Village Limit
45	17+070	LHS	T	Kadayrapanahalli Village Limit
46	17+100	LHS	T	Kadayrapanahalli Village Limit
47	17+250	RHS	T	Near Dummanur village
48	17+450	RHS	T	Near Dummanur village
49	18+660	RHS	T	Dummanur Village Limit
50	18+750	Both	+	Dummanur Village Limit
51	18+870	RHS	T	Dummanur Village Limit
52	18+930	RHS	T	Dummanur Village Limit

Sl.No.	Design Chainage (Km)	Side	Type of Intersection	Other features
53	19+010	RHS	T	Dummanur Village Limit
54	19+030	LHS	T	Kadayarapanahalli
55	19+190	Both	+	Dummanur Village Limit
56	20+020	LHS	T	Mylanahalli
57	20+710	RHS	T	Bandikodigehalli, Ammanikeri Village Limit
58	20+780	LHS	T	Bandikodigehalli, Ammanikeri Village Limit
59	20+820	RHS	T	Bandikodigehalli, Ammanikeri Village Limit
60	20+870	RHS	T	Bandikodigehalli, Ammanikeri Village Limit
61	20+890	RHS	T	Bandikodigehalli, Ammanikeri Village Limit

E.10 CRASH BARRIERS

RCC crash barriers are proposed on both sides of bridges and culverts. Besides that, metallic W beam crash barriers are proposed on both sides of approaches to bridges and outer edges of horizontal curves.

Table E-14 : Crash Barrier Locations

SI. No.	Design Chainage	Length in Mts	SI. No.	Design Chainage	Length in Mts
		BOTH			BOTH
1	2+100	7.5	22	12+470	8
2	2+750	10.5	23	12+630	16
3	3+390	9	24	12+860	6.5
4	3+980	7.5	25	14210	10
5	4+340	6.5	26	14+960	7.5
6	4+460	6.5	27	15+080	6
7	4+680	6	28	15+610	10.3
8	4+960	6.5	29	16+080	6
9	6000	10	30	16+230	5.1
10	7+000	7.5	31	16+250	5.5
11	7+040	7.5	32	16+310	6.5
12	7+640	6.5	33	16+410	8.25
13	8+350	7.5	34	17+720	9
14	9+680	6.5	35	18+905	6.5
15	11+270	6.5	36	19+480	9
16	11+400	6.5	42	19+800	1.2

Sl. No.	Design Chainage	Length in Mts
		BOTH
17	11+540	6.5
18	11+640	6.5
19	11+880	6.5
20	11+960	6.5
21	12+140	6.5

Sl. No.	Design Chainage	Length in Mts
		BOTH
43	20+010	1.2

Table E-15 : W-Beam metal crash barriers Locations

Sl. No.	Design Chainages		Length (m)	Side
	From (Km)	To (Km)		
1	4+663	4+790	127	RHS
2	4+904	4+990	85	LHS
3	4+992	5+101	109	RHS
4	6+094	6+226	132	RHS
5	8+758	8+859	102	LHS
6	9+179	9+259	81	RHS
7	9+280	9+426	146	RHS
8	9+831	9+933	101	RHS
9	12+328	12+607	279	RHS
10	12+599	12+769	170	LHS
11	12+774	12+935	160	RHS
12	14+099	14+284	185	RHS
13	14+298	14+349	51	LHS
14	14+358	14+428	70	RHS
15	14+795	14+902	107	RHS
16	14+902	15+016	114	LHS
17	15+480	15+630	151	LHS
18	16+330	16+481	151	RHS
19	17+052	17+246	195	RHS
20	17+276	17+396	121	RHS
21	18+783	18+907	124	RHS
22	20+665	20+724	59	LHS
23	20+739	20+864	125	RHS
24	21+398	21+492	94	RHS
25	21+565	21+622	57	LHS
26	21+629	21+672	43	RHS
Total length in Km			3.037km	

E.11 BUS BAYS AND TRUCK LAYBYES

The locations of the Truck laybyes and Busbays are given in table below.

Table E-16 : Proposed Locations of Truck Parking / Laybye

Sl. No.	Packages	Existing Chainage	Design Chainage	Side
Nil				

Table E-17 : Proposed Locations of Bus Bays

Sl. No.	Existing Chainage	Road Name	Design Chainage	LHS / RHS		Name of Place
	LHS		LHS			
1	0+000	MDR	0+000	LHS	RHS	Budigere Cross
2	2+180	MDR	2+180	LHS	-	St.Gobain Grindwell Norton bus stop
3	4+370	MDR	4+370		RHS	Swami Vivekananda College of Nursing
4	5+850	MDR	5+850	LHS	RHS	Kattu Gollahalli Gate bus stop
5	6+770	MDR	6+770	LHS	-	Jyothipura Cross bus stop
6	7+620	MDR	7+620	LHS		Thirumanahalli cross bus stop
7	8+180	MDR	8+180	LHS		Andhrahalli cross bus stop
8	9+090	MDR	9+090	LHS		Hithahalli bus cross
9	10+440	MDR	10+440		RHS	Budigere
10	13+670	SH	13+670		RHS	Gollahalli cross bus stop
11	15+070	MDR	15+070		RHS	Singahalli bus stop
12	19+520	MDR	19+520	LHS		Kadayarapanahalli cross bus stop
13	20+600	MDR	20+600	LHS		Mylanahalli bus stop

E.12 TOLL PLAZA

No toll plazas are proposed along the project road.

Table E-18 : Toll Plaza Locations

Sl. No.	Package	Existing Chainage	Design Chainage
Nil			

E.13 REHABILITATION AND RESETTLEMENT PLAN

Even though the up gradation of the project road to 4-lane with paved shoulder is likely to bring large number of benefits, a few number of negative impacts are also likely to occur due to land acquisition. A total of 16 Acres of land are proposed to be acquired by keeping 18 to 23m ROW for main carriageway and 30m ROW for Bypasses.

A total of 8 settlements spread out along the project road are likely to be directly / indirectly impacted due to the proposed widening scheme which includes:

- Loss of agriculture / commercial lands
- Loss of residential / commercial buildings
- Loss of sources of income
- Loss of private immovable properties including cultivation lands, commercial / residential buildings, shops, wells, trees, standing crops, etc.,
- Loss of civil amenities.

Appropriate measures have been taken to minimize these impacts, to the maximum possible extent.

The summary of land acquisition is given in below table

Table E-19 : Summary of Land Acquisition Details

Sl. No.	Design Chainage		Forest Area in Sqm.	Non Forest Area in Sqm.	Name of Locations	LA Rates Per Acre in Crores	Amount in Crores
	From	To					
1	0+000	0+400	0.00	0.5	Agriculture land	3	1.5
2	9+100	9+950	0.00	1.1	Agriculture land	3	3.3
3	9+950	11+300	0.00	10.0	Agriculture land	3	30
4	14+300	16+100	0.00	1.3	Agriculture land	3	3.9
5	16+450	17+150	0.00	0.5	Agriculture land	3	1.5
6	17+650	18+600	1.2	0.00	Agriculture land	3	3.6
7	18+600	20+110	0.00	1.1	Agriculture land	3	3.3
Total Area in Acres				**16.0**	**Total Cost in crores**		**48**

E.14 COST ESTIMATES

The project cost is arrived based on proposals recommended for Four lanes with paved shoulders and typical cross sections arrived. Rate analysis has been worked out considering the Schedule of Rates of PWD SR.

Table E-20 : Schedule of Rates Considered

Packages	Chainage		Length, Km	Schedule of Rates Considered.	Area Weightage Considered.
	From	To			
1	Km 000.000	Km 20.110	20.11	PWD SR, Bangalore circle	3%

Total cost of construction for the entire stretch has been worked out and presented.

E.15 RECOMMENDATIONS

Feasibility study confirmed that rehabilitation and up gradation of the existing road as a whole is technically viable and the following recommendations are made:

- Provision of 18 m to 23 m ROW in normal section and 30m ROW for the Bypasses.
- Proposed length of project road is 20.110 Kms
- Provision of bypass at Budigere from km 9+950 to 11+300 km to a total length of 1.35 Kms.
- Total 43 No's of Bridges and other Structures are being proposed along the project road in which 2 No's of Minor Bridges. and 41 numbers of culverts are being proposed along the project road consisting of 5 No's with NP pipes and 34 No's of Box culvert.
- The total land area required is 16 acres.
- The estimated cost for civil works is 146.40 Crores for Flexible Pavement.

Table E-22 : Salient Features of the Proposed Project Roads

Sl. No.	Components	Package-1
1	Length of 4-Lane (in Kms)	19.610
2	Length of 6-Lane (in Kms)	0.50
3	Realignment (in Kms)	6.54
	Total (in Kms)	20.110
4	No. of Bypass	1
5	No. of Bridges	43
6	No. of Culverts	37
7	No. of Major junction	3
8	No. of Minor Junctions	66
9	No. of Villages	8
10	No. of Towns	-
11	No. of Bus bays	13